# Habitat Restoration in the Delta

## The Delta Independent Science Board Review

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## The Coequal Goals

California Senate Bill SBX7 1 (effective February 3, 2010):

*"achieve the two coequal goals of providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem … in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place"*

Photo: California DWR

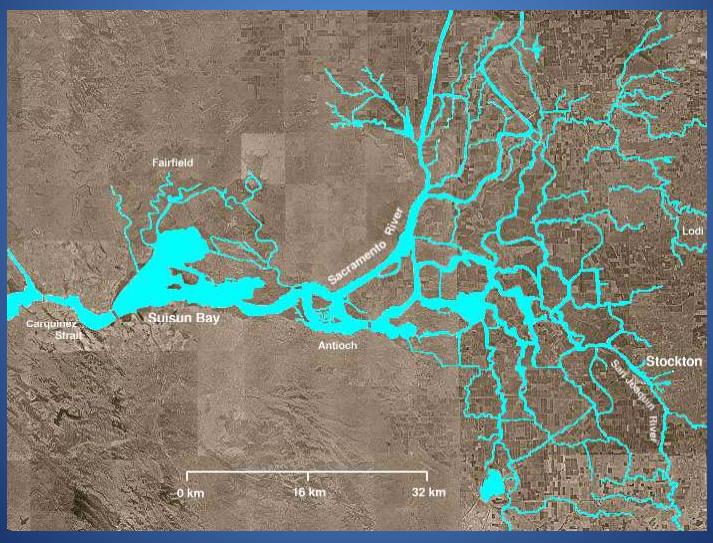
Photo: John Wall

# Delta Independent Science Board

## Delta Reform Act:

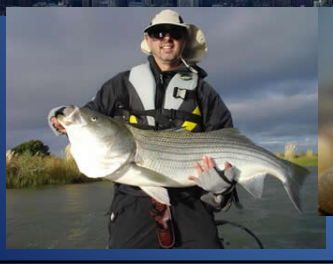
*The Delta Independent Science Board shall provide oversight of the scientific research, monitoring, and assessment programs that support adaptive management of the Delta through periodic reviews*

# The Delta is a Labyrinth

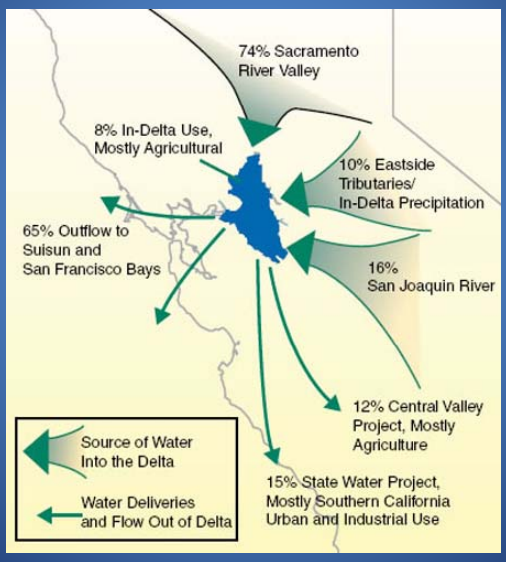


# Who Gets the Water?





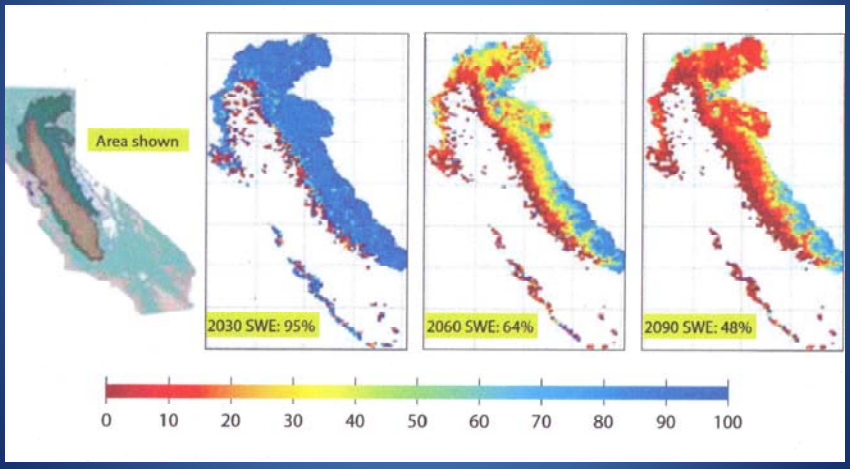

# Where Does the Water Come From, and Where Does it Go?




Source: California Legislative Analyst's Office/Capital Press

# What Does the Future Look Like?

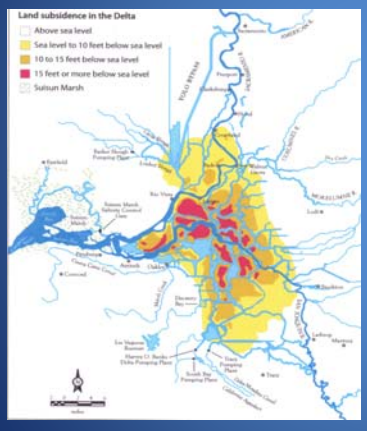
## Snow Water Equivalent




Source: Hanak *et al.* 2011

# What Does the Future Look Like?

## Sea Level Rise



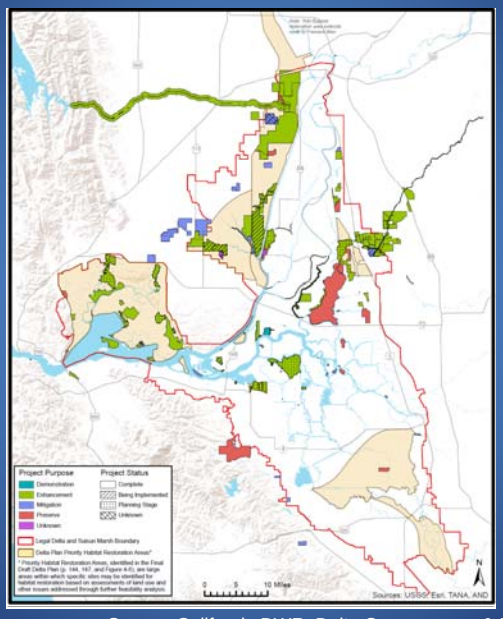

Source: California DWR


Source: Weiss et al., 2011

# Habitat Restoration in the Delta

- What is being done and planned?
- How is science being used?
- How are the potential effects of climate change being considered?

# Habitat Projects in the Delta




*Disclaimer: This map is intended for informational uses and was created from an evolving database. Accuracy has not been verified. Boundaries may represent properties and not actual projects.*

Source: California DWR, Delta Conservancy, & Delta Science Program

## BDCP Habitat Restoration

- 65,000 acres tidal wetlands
- 10,000 acres seasonally inundated floodplain
- 20 miles channel margin
- 5,000 acres riparian habitat

+ additional restoration for terrestrial species and communities

Source: Bay Delta Conservation Plan, March 2013

## The Review Process

- presentations and discussions with representatives of 25 agencies, water districts, consultants, NGOs, universities
- attended presentations at Bay-Delta Science Conference
- reviewed background and planning documents

- drew on our own expertise and experiences

## What Did We Find?

## Our Overall Impressions

- there is a high level of skill and enthusiasm among those most directly involved in restoration
- there is lots of good restoration being done

## The Ideal: *Goals are clear*

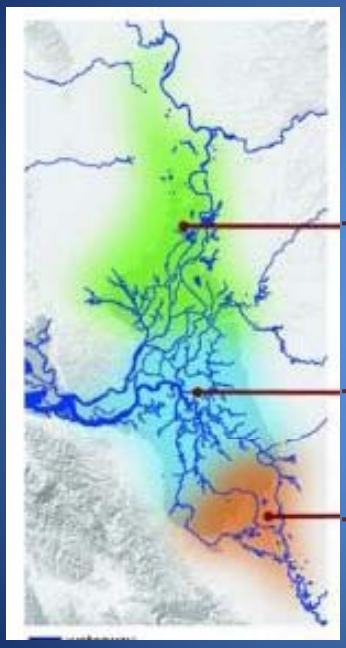
### The findings:

- most projects have well-defined goals and targets
- not clear how diverse project goals will contribute to restoring the Delta as a whole
- targets not always ecologically appropriate
- few indications of rigorous, operational performance measures

## The Ideal: *Spatial context is part of design*

### The findings:

- projects are constrained by site availability, permitting, and funding
- even when carefully planned, projects are often implemented independently, without considering the surrounding landscape
- projects might be linked in networks based on shared goals, targets, landscape setting, etc.



Operational Landscape Units (Whipple et al. 2012)

North Delta

Central Delta

South Delta

The Ideal: *Temporal context is part of design*

The findings:

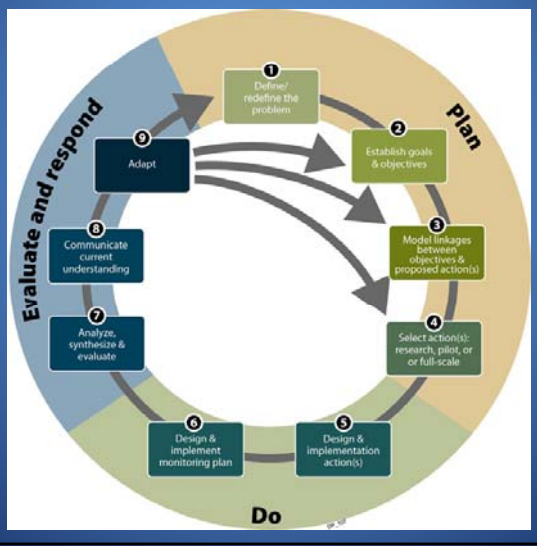
- when climate change is considered, it is usually in the context of sea-level rise
- few specific actions and little attention to long-term risks
- threshold changes rarely considered
- uncertainty will require flexibility

The Ideal: *Adaptive management is part of design*

The findings:

- mandated by Delta Reform Act, and everyone talked about it
- few specifics provided
- no agreement about how adaptive management should be done, who should do it, or who should provide the long-term funding

## Adaptive Management
### In the Delta Plan



## The Ideal: *Monitoring is part of design*

### The findings:

- importance is widely recognized
- insufficient attention to what, when, how often, and how long to monitor
- methods and data management are not standardized
- long-term commitment and funding are lacking

## The Ideal: *Modeling is used effectively*

### The findings:

- models can provide insights into broad-scale processes and scenarios of future changes
- use of models is currently inconsistent and decentralized
- sophisticated modeling is expensive and demands specialized expertise
- a modeling consortium could facilitate sharing of expertise

## The Ideal: *Planning and implementation are coordinated*

### The findings:

- all parties recognize the need for coordinated efforts
- activities at all levels and scales must be coordinated
- restoration should be coordinated with other management decisions
- coordination requires communication and sharing of data and findings

## The Ideal: *Scientific expertise is sufficient*

### The findings:

- scientific needs should be identified during planning
- scientists involved in planning and implementation are spread thin; science staffing in agencies should be strengthened
- consultants and NGOs bring important scientific expertise
- greater use can be made of expertise in universities

## The Ideal: *Stakeholders are involved*

## The findings:

- communication with key stakeholders is generally good
- outreach to those affected should occur throughout planning and implementation
- communication with stakeholders is not science, but it is essential to conducting science-based restoration

## Our Recommendations

## The Recommendations

1. *Establish a mechanism to coordinate planning and implementation of habitat restoration projects to capitalize on potential synergies and complementarities*

## The Recommendations

2. *Incorporate uncertainty and potential climate-change effects in the design and implementation of habitat restoration projects, using modeling where appropriate*

## The Recommendations

3. *Prioritize restoration projects in strategically designed networks to make the best use of limited funds*

## The Recommendations

4. *Strengthen and integrate scientific information and expertise to support monitoring and adaptive management*

# Conclusions